



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

MA

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/773,201	02/09/2004	Kia Silverbrook	MTB20US	8285

24011 7590 09/25/2006

SILVERBROOK RESEARCH PTY LTD
393 DARLING STREET
BALMAIN, NSW 2041
AUSTRALIA

EXAMINER

CHOI, HAN S

ART UNIT PAPER NUMBER

2853

DATE MAILED: 09/25/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/773,201

Applicant(s)

SILVERBROOK, KIA

Examiner

Han S. Choi

Art Unit

2853

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 June 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-54 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) See Continuation Sheet is/are rejected.
- 7) ☒ Claim(s) 2-5,8,9,12,15,17,20-23,27,28,31,34,36,39-42,45,48,51 and 53 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 09 February 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 6/29/06.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____.

Continuation of Disposition of Claims: Claims rejected are 1,6,7,10,11,13,14,16,18,19,24-26,29,30,32,33,35,37,38,43,44,46,47,49,50,52 and 54.

DETAILED ACTION

Terminal Disclaimer

1. The terminal disclaimer filed on 6/29/06 disclaiming the terminal portion of any patent granted on this application which would extend beyond the expiration date of USSN 10/773195 (Pub. No. 2004/0155934) has been reviewed and is accepted. The terminal disclaimer has been recorded.

Response to Arguments

2. Applicant's arguments filed 6/29/06 have been fully considered but they are not persuasive. The applicant's argument regarding claims 1, 6, 19, 25, 38, and 43 is noted. However, even though Ims teaches a "side-shooter," the heater taught by Ims is generally planar, having a plane (eg. In a thickness direction) which is parallel to the plane of the nozzle, and is laterally enclosed by the bubble forming chamber such that the plane of the heater extends through the interior surface of the bubble forming chamber.

Claim Objections

3. Claims 1, 19, and 38 are objected to because of the following informalities: "the plane of the heater element" lacks antecedent basis. Appropriate correction is required.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1, 6, 19, and 25 rejected under 35 U.S.C. 102(b) as being anticipated by Ims (US Pat. 4,797,692).

Referring to claims 1 and 19:

- an ink jet printhead [10] in [Col. 4, Line 48] shown in Fig. 1. and a printer system in [Col. 4, Lines 7-9]
- a plurality of nozzles in [Col. 8, Lines 44-45]
- a bubble forming chamber corresponding to each of the nozzles respectively in [Col. 8, Lines 7-9]
- a generally planar heater element disposed in each of the bubble forming chambers respectively and in thermal contact with a bubble forming liquid in [Col. 8, Lines 10-11 and Lines 24-25]
- heating the heater element above the boiling point of the bubble forming liquid forms a gas bubble that ejects a drop of ejectable liquid from the nozzle in [Col. 5, Lines 39-50].
- the plane of the heater element is parallel to the plane of the nozzle, and the heater element [18] is laterally enclosed by the bubble forming chamber such

that the plane of the heater element extends through the interior surface of the bubble forming chamber [22] in Fig. 2.

Referring to claims 6 and 25:

- the bubble forming liquid and the ejectable liquid are of a common body of liquid in [Col. 5, Lines 39-50].

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 7, 11, 18, 26, 30, and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ims (US Pat. 4,797,692) in view of Kubby (US Pat. 5,706,041).

Ims discloses the basic elements of the claimed invention except for a page-width printhead configuration, the heater element having two opposite sides and configured such that a gas bubble formed by the heater element is formed at both of the sides of the heater element, and the heater element substantially covered by a conformal protective coating, all sides of the coating being seamless.

Kubby, acknowledged prior art, teaches the printhead extending across the entire width of the sheet. Kubby teaches the heater element [20a and 20b] causing a gas bubble to be formed on both sides of the heater element [20a or 20b] in [Col. 4, Lines 59-63]. Kubby teaches a heater element [20a or 20b] that is substantially covered by a

protective coating substantially to all sides, which are seamless in [Col. 4, Lines 32-50] shown in Fig. 4.

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to incorporate the elements taught by Kubby to the printhead of Ims for the purpose of placing an image on a sheet in a single pass, ejecting a sufficient amount of ink from the ejector, and protecting the heater.

8. Claims 10 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ims (US Pat. 4,797,692) in view of Feinn et al. (US Pat. 6,543,879).

Ims discloses the basic elements of the claimed invention except for a nozzle density greater than 10000 nozzles/cm².

Feinn et al., acknowledged prior art, teaches in [Col. 2, Lines 1-14] a nozzle packing density of at least 100 nozzles/mm², which is equal to 10000 nozzles/cm² when converted to square centimeters.

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to incorporate the nozzle density of Feinn et al. to the printhead of Ims for the purpose of accommodating higher printing resolutions and to improve the printhead drop generation rate in [Col. 1, Lines 57-61].

9. Claims 13, 24, and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ims (US Pat. 4,797,692) in view of Silverbrook (US Pat. 5,841,452).

Ims discloses the basic elements of the claimed invention except for the heater element configured such that an actuation energy of less than 500 nanojoules is required to heat the heater element sufficiently to form a bubble to cause the ejection of a drop, and except for a structure incorporating nozzles formed by chemical vapor deposition (CVD).

Silverbrook ('452), acknowledged prior art, teaches that typically 200 nanojoules is required to eject a drop by heating the heater element in [Col. 18, Lines 15-18]. Silverbrook ('452) teaches a thick chemical vapor deposition (CVD) glass over coat [142] which forms the nozzle region in [Col. 9, Lines 57-58] shown in Fig. 12.

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to incorporate the requirement of applying a typical heating energy of 200 nanojoules, and a nozzle plate formed by chemical vapor deposition (CVD) to the heating element and printhead of Ims for the purpose of maintaining print speed while reducing power dissipation and to provide mechanical strength to resist the shock of exploding or collapsing vapor bubbles and to provide protection against the external environment in [Col. 8, Lines 22-25].

10. Claims 14 and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ims (US Pat. 4,797,692) in view of Kashino et al. (US Pat. 5,534,898).

Ims discloses the basic elements of the claimed invention except for a nozzle plate of the printhead having a thickness of less than 10 microns.

Kashino et al., acknowledged prior art, teaches a thickness of an orifice plate in the order of several microns in [Col. 6, Lines 34-41].

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to incorporate the thickness of the Kashino et al. nozzle plate to the Ims printhead for the purpose of obtaining adequate values of the velocity of the discharged ink droplets, amount of ink droplet and refilling frequency, and in consideration of the distance between the thermal energy generating element and the discharge port.

11. Claims 16 and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ims (US Pat. 4,797,692) in view of Chan (US Pat. 5,710,070).

Ims discloses the basic elements of the claimed invention except for a heater element formed of solid material of which more than 90% of which, by atomic proportion, is constituted by at least one periodic element having an atomic number below 50.

Chan teaches a thermal inkjet printhead comprising a resistive layer composed of titanium nitride, which forms a resistor and a contact metal barrier layer in [Col. 2, Lines 10-14]. Titanium has an atomic number less than 50 on the periodic table.

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to incorporate the titanium nitride resistor of Chan to the printhead of Ims for the purpose of having resistors that are more reliable, especially at higher temperatures and less complicated to manufacture.

12. Claims 38 and 43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ims (US Pat. 4,797,692) in view of Fukuchi et al. (US Pat. 4,549,191).

Ims discloses the basic elements of the claimed invention except for supplying the nozzle with a replacement volume of the ejectable liquid equivalent to the ejected drop.

Fukuchi et al. teaches replacing an amount equal in volume to the ink that was ejected from the nozzles in [Col. 1, Lines 35-38].

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to incorporate the teaching of Fukuchi et al. with the printhead of Ims for the purpose of preventing ink degeneration in the pressure chamber in [Col. 3, Lines 51-58].

13. Claims 44, 47, and 54 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ims (US Pat. 4,797,692) in view of Fukuchi et al. (US Pat. 4,549,191) as applied to claims 38 and 43 above, and further in view of Kubby (US Pat. 5,706,041).

Ims in view of Fukuchi et al. discloses the basic elements of the claimed invention except for a page-width printhead configuration, the heater element having two opposite sides and configured such that a gas bubble formed by the heater element is formed at both of the sides of the heater element, and the heater element substantially covered by a conformal protective coating, all sides of the coating being seamless.

Kubby teaches the printhead extending across the entire width of the sheet. Kubby teaches the heater element [20a and 20b] causing a gas bubble to be formed on both sides of the heater element [20a or 20b] in [Col. 4, Lines 59-63]. Kubby teaches a heater element [20a or 20b] that is substantially covered by a protective coating substantially to all sides, which are seamless in [Col. 4, Lines 32-50] shown in Fig. 4.

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to incorporate the elements taught by Kubby to the printhead of Ims in view of Fukuchi et al. for the purpose of placing an image on a sheet in a single pass, properly heating the ink, and protecting the heater.

14. Claim 46 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ims (US Pat. 4,797,692) in view of Fukuchi et al. (US Pat. 4,549,191) as applied to claims 38 and 43 above, and further in view of Feinn et al. (US Pat. 6,543,879).

Ims in view of Fukuchi et al. discloses the basic elements of the claimed invention except for a nozzle density greater than 10000 nozzles/cm².

Feinn et al. teaches in [Col. 2, Lines 1-14] a nozzle packing density of at least 100 nozzles/mm², which is equal to 10000 nozzles/cm² when converted to square centimeters.

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to incorporate the nozzle density of Feinn et al. to the printhead of Ims in view of Fukuchi et al. for the purpose of accommodating higher

printing resolutions and to improve the printhead drop generation rate in [Col. 1, Lines 57-61].

15. Claim 49 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ims (US Pat. 4,797,692) in view of Fukuchi et al. (US Pat. 4,549,191) as applied to claims 38 and 43 above, and further in view of Kashino et al. (US Pat. 5,534,898).

Ims in view of Fukuchi et al. discloses the basic elements of the claimed invention except for a nozzle plate of the printhead having a thickness of less than 10 microns.

Kashino et al. teaches a thickness of an orifice plate in the order of several microns in [Col. 6, Lines 34-41].

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to incorporate the thickness of the Kashino et al. nozzle plate to the Ims in view of Fukuchi et al. printhead for the purpose of obtaining adequate values of the velocity of the discharged ink droplets, amount of ink droplet and refilling frequency, and in consideration of the distance between the thermal energy generating element and the discharge port.

16. Claim 50 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ims (US Pat. 4,797,692) in view of Fukuchi et al. (US Pat. 4,549,191) as applied to claims 38 and 43 above, and further in view of Silverbrook (US Pat. 5,841,452).

Ims in view of Fukuchi et al. discloses the basic elements of the claimed invention except for a structure incorporating nozzles formed by chemical vapor deposition (CVD).

Silverbrook ('452) teaches a thick chemical vapor deposition (CVD) glass over coat [142] which forms the nozzle region in [Col. 9, Lines 57-58] shown in Fig. 12.

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to incorporate a nozzle plate formed by chemical vapor deposition (CVD) to the heating element and printhead of Ims in view of Fukuchi et al. for the purpose of providing mechanical strength to resist the shock of exploding or collapsing vapor bubbles and to provide protection against the external environment in [Col. 8, Lines 22-25].

17. Claim 52 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ims (US Pat. 4,797,692) in view of Fukuchi et al. (US Pat. 4,549,191) as applied to claims 38 and 43 above, and further in view of Chan (US Pat. 5,710,070).

Ims in view of Fukuchi et al. discloses the basic elements of the claimed invention except for a heater element formed of solid material of which more than 90% of which, by atomic proportion, is constituted by at least one periodic element having an atomic number below 50.

Chan teaches a thermal inkjet printhead comprising a resistive layer composed of titanium nitride, which forms a resistor and a contact metal barrier layer in [Col. 2, Lines 10-14]. Titanium has an atomic number less than 50 on the periodic table.

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to incorporate the titanium nitride resistor of Chan to the printhead of Ims in view of Fukuchi et al. for the purpose of having resistors that are more reliable, especially at higher temperatures and less complicated to manufacture.

Allowable Subject Matter

18. Claims 2-5, 8, 9, 12, 15, 17, 20-23, 27, 28, 31, 34, 36, 39-42, 45, 48, 51, and 53 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims and to overcome the objection, see paragraph 4 above.

Conclusion

19. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).


A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Han S. Choi whose telephone number is (571) 272-8350. The examiner can normally be reached on Monday - Friday, 8:30am to 5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Meier can be reached on (571) 272-2149. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

HSC
9/12/06

 9/18/06
MANISH S. SHAH
PRIMARY EXAMINER